

**THE EXTENT OF ARCHITECT'S INTEGRATION INTO THE
DESIGN & BUILD CONSTRUCTION PROCESS
IN PENINSULAR MALAYSIA.**

TAN SEONG YEOW

**THE EXTENT OF ARCHITECT'S INTEGRATION INTO THE
DESIGN & BUILD CONSTRUCTION PROCESS
IN PENINSULAR MALAYSIA.**

By

TAN SEONG YEOW

(S0704/00-04, Session 2000-2002)

Thesis submitted in partial fulfillment of the requirements for the degree of

Master of Science (Project Management)

Faculty of Housing, Building and Planning (HBP)

Fakulti Perumahan, Bangunan dan Perancangan

UNIVERSITI SAINS MALAYSIA

Mac 2002

ABSTRACT

The Design and Build procurement method has been credited as a viable instrument to produce building delivery efficiency in the construction industry. This is especially so during a economic recession where the Government needs to inject equity into the national economy through the building of civil and institutional buildings.

Its fast track approach helps to release monies to the various parties in the industry but its main beneficiary is the contractor who becomes the leader of the team. The architect who traditionally leads the building team has been sidelined to a mere designer with minimal involvement in the contract administration. Claims that the architect is relieved of major liabilities to be borne by the contractor is a fallacy that needs to be exposed. The use of novation could be explored as a means for the architect to play a more integrated role in the D&B process.

This study is a indicative finding on the perceived extent of the architect's integration into the Design and Build construction process in Peninsular Malaysia. The literature review covers the basic principles of Design and Build, its case study application in the United Kingdom, Singapore and Malaysia. A hypothesis is then established with 'architect's integration' defined as the importance and extent of his role, the desirability of the procurement process and the ability to participate effectively in it. A survey among the architects is then

conducted in collaboration with PAM (Malaysian Institute of Architects). The findings are then analyzed and the hypothetical statement reviewed.

The conclusion to the study is that the extent of architect's integration into the D&B process is influenced by the issues of :

- 1) the role of the architect being eroded to a mere designer yet his statutory and contractual liabilities are not reduced and may in fact increase in exposure.
- 2) the disadvantageous payment structure that is back-ended according to construction schedule and the loss of contract administration work scope and hence that portion of fees.
- 3) Architect's handicap in project management skills of communicating effectively with other construction team members and the lack of a effective system to deal with design changes in D&B.
- 4) The use of novation to the architect's advantage where there is design continuity to ensure client's intended quality and 'fitness of purpose". This is to potentially increase his role in contract administration although this is not the case as yet. The issues of relationship conflict with contractor and client also has to be resolved.

ABSTRAK

Kaedah perolehan 'Design and Build' telah diiktirafkan sebagai satu cara untuk meningkatkan produktiviti industri pembinaan. Ini memandangkan usaha kerajaan untuk mengalirkan ekuiti kedalam ekonomi negara melalui projek-projek pembinaan bangunan sivil dan institusi.

Sifat 'fast track' dalam kaedah ini dapat membantu kedudukan kewangan ahli-ahli industri terutamanya para kontraktor yang menjadi pemimpin pasukan pembinaan didalam kaedah perolehan ini. Para akitek yang secara tradisinya menjadi ketua pasukan pembinaan, telah disisirkan perannya, menjadi pereka semata-mata dengan pembabitan minima didalam pengurusan kontrak. Kononnya bahawa akitek dapat meringkan beban liabilitinya kepada kontraktor adalah merupakan satu persepsi yang silap. Walau bagaimanapun, penggunaan 'novation' perlu dijelajahi sebagai satu kaedah untuk akitek memainkan peranan yang lebih mendalam bagi kaedah D&B.

Kajian ini adalah bertuju kepada persepsi tahap integrasi akitek kedalam proses D&B di Semenanjung Malaysia. Kajian ilmiah yang dilakukan meliputi prinsip asas "Design and Build", aplikasinya di United Kingdom, Singapura dan Malaysia. Hipotesis kemudian di kemukakan dengan 'integrasi akitek' didefinasikan sebagai keberkesanan peranannya, pentingnya kaedah perolehan kepadanya dari segi kewangan dan kebolehan akitek untuk melibatkan dirinya

secara efektif. Satu kajian soal selidik ditujukan kepada para akitek dengan pertolongan Persatuan Akitek Malaysia (PAM) dimana keputusannya akan dianalisis dan kenyataan hipotesis di perbetulkan.

Ringkasan keputusan kajian ini adalah bahawa tahap integrasi akitek kedalam proses D&B adalah dipengaruhi oleh isu-isu:

- 1) Peranan professionalisme akitek yang dihakis menjadi pereka semata-mata. Akantetapi tanggungan liabilitinya secara statutori dan kontraktual tidak berkurangan, malahan risikonya mungkin bertambah.
- 2) Struktur pembayaran yang bersifat 'back-ended' mengikut jadual proses pembinaan meletakkan beban kewangan keatas akitek dan kehilangan peranan di dalam pengurusan kontrak bererti akitek tidak dapat mengaut keuntungan dari skop kerja itu.
- 3) Akitek mempunyai kekurangan dari segi kemahiran pengurusan projek terutamanya perhubungan komunikasi dengan ahli-ahli pasukan pembinaan. Akitek juga tidak ada system pengendalian efektif terhadap perubahan rekabentuk yang menjadi sifat pembinaan D&B.
- 4) Penggunaan 'novation' perlu untuk kemajuan akitek dimana terdapat proses rekabentuk yang berterusan bagi mencapai tahap kualiti dan 'fitness of purpose' klien. Ini berpotensi memajukan peranannya didalam pengurusan kontrak walaupun pada masa sekarang ianya bukan sedemikian. Isu percanggahan perhubungan dengan klien dan kontraktor juga perlu di selesaikan.

ACKNOWLEDGEMENTS

I would like to first and foremost, thank my beloved parents for their unwavering support for me and my dreams. Due acknowledgement must also be extended to my employer Mr. Ding Poi Kooi for his moral and financial support, in allowing me to study part time in USM.

The continuation of my studies in Project Management is due to my background as a graduate architect from Universiti Teknologi Malaysia (UTM) who is interested in expanding my own understanding, acquiring new skills and knowledge. My endeavor is based on a realization that one needs to continually improve one's own wealth of knowledge and that learning is a lifelong process that continues even after tertiary graduation.

To this end I must surely extend my heartfelt thanks to my thesis supervisor, En. Abdul Azizz Hussin, for his continual guidance and patience in helping me to direct the thesis to a eventual completion. Also not forgetting the ever helpful people from the Malaysia Institute of Architects (PAM) especially its President, Ms. Tan Pei Ing, Mr. Chee Soo Teng (Council Member) and Cik Azizah of PAM administration for their part in making the thesis survey a success.

TABLE OF CONTENT

| | |
|--|------|
| 1.0 CHAPTER 1: Introduction | |
| 1.1 Dissertation of Problem Statement | 1-1 |
| 1.2 the Study | 1-3 |
| 1.3 Hypothesis | 1-4 |
| 1.4 Scope of Study | 1-5 |
| 1.5 Methodology of study | 1-6 |
| 1.6 Duration of study | 1-7 |
| | |
| 2.0 CHAPTER 2 : Literature Review | |
| | |
| 2.1 Part 1: General Principles of Design & Build | |
| 2.1.1 Definitions | 2-1 |
| 2.1.2 Key Elements of Design and Build Contracts | 2-3 |
| 2.1.3 The Roles of Consultants in D&B | 2-16 |
| 2.1.4 Novation of Consultants in D&B | 2-19 |
| 2.1.5 "Fitness of Purpose" and "Due Diligence"- Its relation to consultants under D&B. | 2-21 |
| 2.2 Part 2 : Design & Build practice issues in various countries. | |
| 2.2.1 Design and Build Practices in the United Kingdom | 2-27 |
| 2.2.2 Design and Build Practices in Singapore | 2-33 |
| 2.2.3 Design and Build Practices in Malaysia | 2-36 |
| 2.2.4 Comparative analysis | 2-46 |

| | |
|---|------|
| 3.0 CHAPTER 3 : Survey | |
| 3.1 Method of Survey | 3-1 |
| 3.2 Sampling | 3-1 |
| 3.3 Constructing the Survey Questionnaire | 3-5 |
| 4.0 CHAPTER 4 : Data Analysis | |
| 4.1 Data Results | 4-1 |
| 4.2 Comparative Analysis of Data | 4-2 |
| 5.0 CHAPTER 5 : Conclusion | |
| 5.1 Amendments to hypothesis | |
| 5.1.1 (a-e) Hypothesis 1 | 5-1 |
| 5.1.2 (a-e) Hypothesis 2 | 5-6 |
| 5.1.3 (a-e) Hypothesis 3 | 5-9 |
| 5.1.4 (a-e) hypothesis 4 | 5-11 |
| 5.2 Summary | 5-14 |
| Bibliography | |
| Appendix | |

LISTS OF TABLES AND FIGURES.

| | |
|--|------|
| Figures: | |
| Figure1: Flowchart of Study Methodology | 1-5 |
| Figure2: Client/contractor design input relative to procurement variation. | 2-14 |
| Tables: | |
| Table 1: Chapman & Powell-Smith (1993) – JCT standard Forms of Building Contract with Contractor's | 2-11 |

| | |
|--|------|
| design, 1981 ed. : Advantages and disadvantages of Design Build. | |
| Table 2: Chappell & Powell Smith (1993), Janssens (1991) and Turner (1986)- The variations in design and build . | 2-12 |
| Table 3: Varieties of Design-Build suitable for circumstances related to Design. | 2-15 |
| Table 4- Breakdown of survey sample (150 nos) according to types of firms | 3-3 |
| Table 5- Breakdown of survey sample according to state and types of firms. | 3-4 |
| Table 6- Breakdown of survey sample (150 nos) and respondents according to types of firms (Question A-1). | 4-1 |
| Table 7- Breakdown of survey sample and respondents(*) according to state and types of firms (question A-1) | 4-2 |

ABBREVIATIONS

- 1) D&B - Design and Build
- 2) PAM- Pertubuhan Akitek Malaysia (Malaysia Institute of Architects)
- 3) MITI (Ministry of International of Trade and Industry)
- 4) QP- Qualified person
- 5) S.O. --Supervising Officer.
- 6) MHLG --Ministry of Housing and Local Government
- 6) S&PA- sales and Purchase Agreement
- 7) JKR- Jabatan Kerja Raya (Public Works Department)
- 8) DBC – Design and Build Contractor

1

INTRODUCTION

1.0 CHAPTER 1: INTRODUCTION

1.1 DISSERTATION OF PROBLEM STATEMENT

The Malaysian Government started the D&B/ Turnkey for their projects in the late 70's as an alternative to the traditional method which produced a lot of costs overrun and excessive delay. A turnkey section in Jabatan Kerja Raya (Public Works Department) was set up in 1983. The environment that forced this situation to come about was the economic recession and the stiff competition by foreign contractors especially from the Japanese and South Korean firms (Steve, 1987).

1997 was the year the Asian Economic Crisis began that started a major economic recession in this region until 2000 where it saw a modest recovery. That was until the 11 September 2001, New York WTC (World Trade Center) bombing tragedy that precipitated the U.S. economic recession and its subsequent downwards effects on the world economic recovery. The national economy of Malaysia, which is very much export based and closely linked to the U.S economy began to suffer and the construction industry experienced one of its worst slumps.

Consultants began to feel the impact of the economic recession on their business practice and the PAM (Malaysia Institute of Architects) has encouraged

its members to venture out and be more actively involved in the design and build procurement method as a way of improving business opportunity. Its confidence on the viability of the procurement method was evident from its MITI submission where PAM President, Dr. Ken Yeang (2001) even goes as far to state that, "...for rapid delivery projects and routine repeat projects, the Design and Build form of contracts have become an increasing popular way of building procurement by both private and public sectors. PAM recommended that the Government appoints those of our architectural firms that are more entrepreneurial (i.e. prepared to take on Design-and-Build Contracts and in partnering relationships with Builders) to become Leaders in their Design-and-Build projects (e.g. for schools, civil servant quarters and housing)...".

Thus the question whether this round of recession had any similar effect of increased usage of D&B, and if so, the extent to which the architects are involved in its evolution in the Malaysian construction industry as a procurement system that is more integrated and efficient.

However, it must be noted that the practice of D&B in Malaysia may differ in its evolution from that of other developed countries that practices it as it would depend on the availability of capital, organizational ability, sophistication of the construction industry and also the awareness of the employer of its potential and limitations, among others. Examples of the variations may consist of the client providing the land and the necessary financing for the development.

Alternatively, the client merely provides the land for the contractor to build on. In this case, the contractor receives no payment until the actual completion of the project. Finally, there is the situation where the client provides neither land nor payment installments (Steve, 1987). The capital outlay available definitely affects the organizational resources of the contractor and how he would manage his risk.

1.2 OBJECTIVES OF THE STUDY

The study is done from the perspective of the contractor's consultant architect. As the procurement process is currently very popular especially during times of recession and there is a call by the President of PAM, Dr. Ken Yeang for the architects to play a more proactive role in design and build to the extend of being the entrepreneur instead of the contractor. Thus the first objective is to establish the current status of the architect and the extent of his integration into the design and build team.

There has been many complains that architects are being sidelined to being a mere designer with minimal importance and that their role as professionals have been compromised. The second objectives of the study helps to clarify this claims, its extent and the reasons it is so. Only then can the architects rectify the situation.

1.3 HYPOTHESIS

Architect's integration into the D&B process are affected by:

- 1) The nature of compressed time in D&B affects the quality of his work and decisions and not the fact that reputable contractors are not interested in quality (relative to time and cost). Latent errors and mistakes can be costly thus increasing his design liability, yet his statutory liabilities are not significantly reduced from conventional methods and they are not factors that attract him to D&B. Other factors include clear client brief that affects the achievement of 'fitness of purpose'.
- 2) Financial attractiveness is due more to pressures of the economic recession, job certainty and sooner payment if the bid is successful and project completed early, rather than the profitability of the procurement itself. This is due to rising cost of insuring against liability, loss of income (omission of contract administration which is touted as reduced liability and burden for the architect) as well as loss for unsuccessful bids.
- 3) His ability to clarify his role and scope of works in the D&B framework with the rest of the construction team, ability to take instructions from the contractor and to communicate effectively with the other consultants of the project to reduce exposure to professional liabilities.
- 4) Novation as a possible tool to integrate architects into the D&B as it allows natural continuity for designers as well as design quality and "fitness of purpose" despite certain disadvantages such as time consuming and ambiguity of liabilities.

1.4 SCOPE OF STUDY

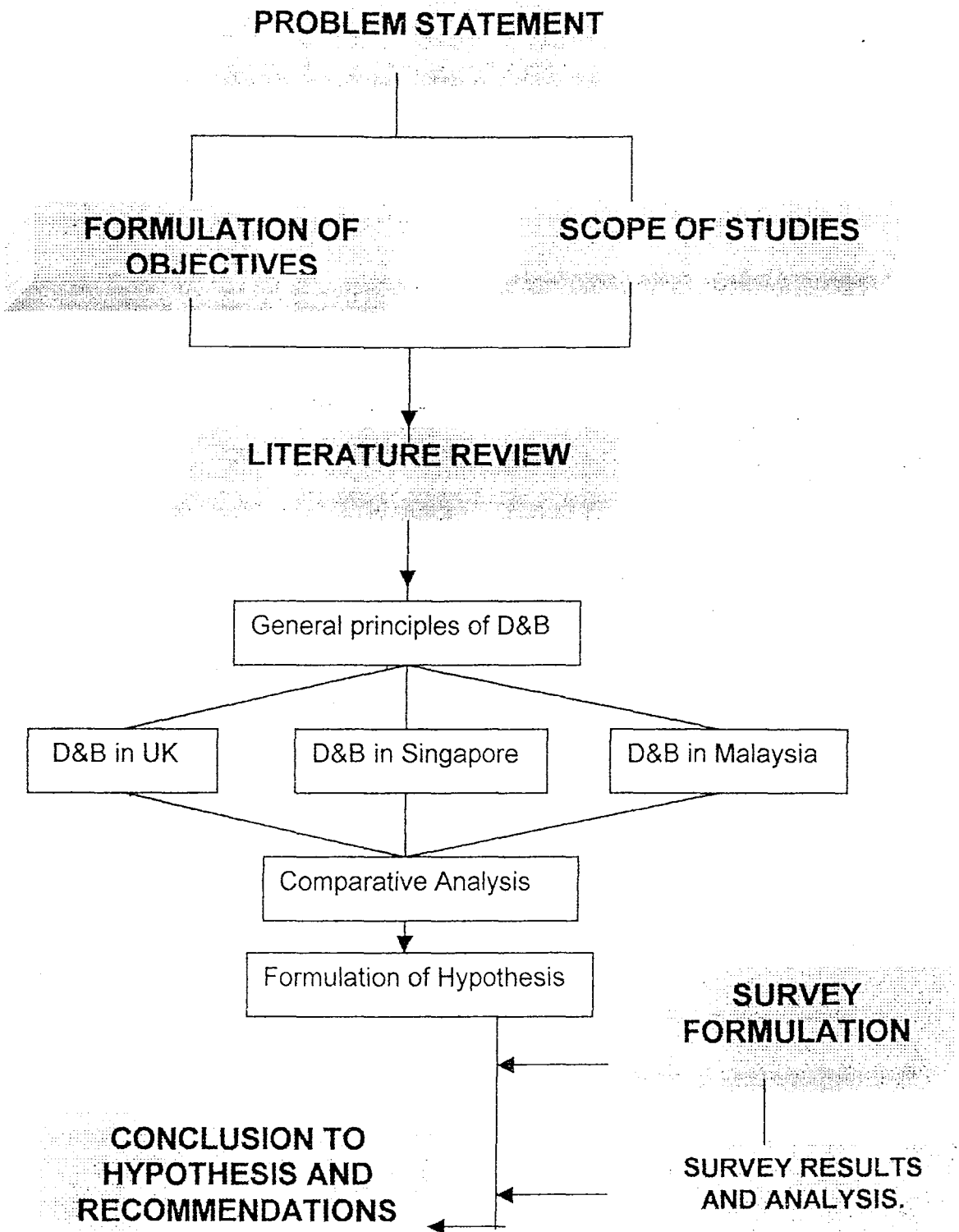
The scope of the study intends to examine the 'integration' of the architect into the process in West Malaysia only. This is because the majority of the firms and projects are located here. The integration of the architect means the importance and the extent of his role as well as his desirability and ability of participating in the procurement process. The study will include literature reviews and a survey conducted to test the hypothetical statements derived from the literature review.

The literature review will cover the basic principles of Design and Build and the roles of consultants, issues peculiar to consultants (novation and design liability) as well as studies done in the United Kingdom (as a developed country using D&B), Singapore (where there is a review of D&B impact on the architectural practice) and 3 case studies done in Malaysia that includes a review of the roles of those involved and a detailed case study review of actual projects.

The study assumes that the reader is already well aware of the D&B process and the terms used as well as the situation of the industry and the context it is in at the time of the study. As such the general review of the D&B process and the discussion of certain terms and events will be brief and sufficient enough to establish a cognitive orientation for the reader in understanding the study.

1.5 METHODOLOGY OF STUDY

(Fig. 1 – Flow chart for Study methodology)



1.6 DURATION OF STUDY

The study schedule was divided into two phase. The first phase is to conduct a literature review which encompass the basic principles and variants of design and build. This was done early in May 2001. The basic reading and collection of articles continued for 4 months. In the duration, a contact meeting was made with the supervising lecturer on the initial study intent and tentative approval was granted. As the reading progressed, the thesis title began to take form and its validity was checked against past studies to avoid duplication.

in September, the survey questionnaire was formulated based on the readings and the subsequent formulation of hypothetical statements. The survey questionnaire and sampling preparation took 2 months to compile and its first draft was reviewed in November. The same month contact was made with the PAM (Malaysian institute of Architects) staff to garner their support for the survey exercise.

In December, the survey forms were ready after proof reading and tested against a architect respondent to see if the answers were easy to understand. The forms were then sent out in early January and the respondents began sending in their replies in February through to early March. During that time a secondary contact were made with respondents from certain states to ensure it adheres to the original sampling. The results were analyzed and the findings were presented by late March 2002

2

LITERATURE REVIEW

2.0 CHAPTER 2: LITERATURE REVIEW

2.1 PART 1: GENERAL PINCIPLES OF DESIGN AND BUILD/ TURNKEY.

2.1.1 Definitions

Greenwood(1988) defines the scope of D&B/turnkey to include the entire process of design, specification, construction, commissioning, operation and sometimes, to include maintenance. The client will usually issue a performance specifications and standard required or outline drawings indicating a preferred layout. The evaluation of turnkey bids is more complex with tender bids submitted in two separate parts; one indicating the bid price and financial aspects and one indicating the proposed design and technical specification, the latter being evaluated before the price is considered.

The bids will initially checked on technical merit which will allow clients to evaluate on purely technical performance basis. The financial evaluation on capital expenditure and running costs would then be carried out possibly using cash discounting methods. Since there is no standard method of evaluation the financial assessment is based on a balance of objective and subjective criteria; the latter possibly including:

- preference for particular type of processes
- experience of previous contracts

- operation and maintenance requirements
- good working relationship.

Duncan(1986) defines turnkey as such, "... a contract where the essential design emanates from, or is supplied by the Contractor and not the owner, so that the legal responsibility for the design, suitability and performance of the work after completion will be made to rest... with the contractor...."Turnkey" is treated as merely signifying the design responsibility as the contractor's...". He continues," ...The turnkey system , however, can be modified. The owner may engage consultants to do the foundation or sub-structure designs leaving only the superstructure the subject of the lump sum turnkey arrangements. This is known as "mix- turnkey contracts... It is clear, therefore that, in its pure form the turnkey contractor is responsible for the planning, construction and supervision of the works. On completion of the works the contractor hands over the completed job to the owner. Sometimes the owner engages consultants to do the foundation and sub-structure design. The contractor is only responsible for the planning, construction and supervision of the rest of the construction work. In order to determine what is the nature of a particular turnkey job, it is necessary to look at the relevant contracts between the parties concerned."

A illustration is the legal case study precedent of London Borough of Newham v. Anglican Ltd. (Robinson ,1988);

Under design and construct agreement, TW built several blocks of flats for LBN. A major progressive collapse occurred due to a domestic gas explosion in one of the blocks, and 4 occupants were killed.

Held: The obligation of a contractor under design and construct contract was to ensure that the design complied with all relevant legislation. The load bearing capability of the design was inadequate, and the contractor was therefore in breach of contract.

Aziz (2001) surmise that package deal (design & build/ turnkey contracts) imply low risk on the design by the employer (but high risk on commitment to a price), and high risk on the design by the contractor (but low risk on commitment to a price) . In package deal contracts, the benefits of the system are realized if the employer (client) can accept the contractor's design proposal without amendment and interference is expensive. Tan (2001) states that the disadvantages to the employer is the loss of control, inability to dictate detail, variations in terms of cost and time and finally the Nominated Sub-Contract is difficult to implement as it is the Employer's recommendation.

2.1.2 Key Elements of design and build contracts

A D&B contract often involves 2 separate teams of consultants, one team on the side of the Employer and the other under the Contractor.

1. Two teams of consultants- Should an Employer be considering a D&B Contract, then the architect should advise him at the onset that he may have to engage his own independent team of consultants for technical guidance and preparation of material that will set out the employer's requirements as well as to check the Design and Build Contractor (DBC) own team of consultant's shop drawing and construction drawings (and further if required, to oversee the quality of their works on site and to prepare the Defects List).

2. Increased cost of tendering – The DBC will find that his costs and efforts in tendering would be higher than the normal forms of contracts. This is because he has to employ his own team of consultants to prepare tender design drawing (if required) at the Tender Stage and Shop-drawings as well as drawings and specifications, during construction. He will particularly notice this if he is unsuccessful in the tender bid.

3. DBC liability for Design- The DBC not familiar with this form of contract will find that the design liability that he has assumed could be much wider than anticipated. In effect, the design and build contract could literally mean that the Contractor does all the design and builds it. This will become evident once he receives the Defects List from the Employer (either progressively or at the end).

4. Level of Design Control- What needs to be established at the onset is the level of design control in this form of contract by the Employer. The Employer's design control in the DBC is often limited at the Level of Schematic Drawings (e.g. @ 1:200 drawings and outline specifications) of the end product. This applies not just to architectural design but also to structural and M&E engineering design. In the traditional form of contract, the team of consultants would complete a fully developed and detailed design and supply all related drawings and documents before issuing relevant instructions to the contractor. Whereas the concept behind design and build contracts assumes that the contractor takes care of the Design Development stages and Detailed Design Scope of Works of the project and is given a relatively freehand when interpreting the Employer's Design Requirements from the Schematic Design onwards.

The D&B contract therefore works best when the Employer appreciates this and trust the DBC. He might need the DBC to establish beforehand, his credibility to the Employer prior to contract by demonstrating the quality of his built precedents.

5. Claims due to Design Changes- Some Employers new to the Design and Build concept may find it difficult to accept loss of design control when they realize that they do not have the exclusive say or free hand in deciding the implementation or outcome of the end product. As a result, the tendency is for

Employers (new to the concept) to issue through their representatives numerous instructions and change orders without realizing the full implications of such instructions.

Prudent DBCs might at the onset ensure in the Form of Contract that their contractual rights are protected by notifying of claims of delays, time related damages and actual costs for having to implement such instructions that are tantamount to variation instructions.

Consequently , disputes will arise as to whether an instruction constitutes a variation and these often relate to the Employers requirements. The issue is whether there had been non-compliance to the Employer's requirements or otherwise.

6. The use of Design Intent Drawings and Documents- The Employer that wishes to have greater say in the end product could of course take steps to have his own requirement prepared in more detail beforehand. This will obviously incur higher costs to him from his own team of consultant in preparing the design and documentation of his more detailed design requirements.

For greater design control, the Employer's team of consultants may do work beyond the schematic Design (i.e. 1:200) and to undertake partial Design

Development, but they should also ensure that they do not provide excessive detail so that they actually end up doing what the DBC is paid to do.

One way not to provide excessive detail, is to do Design Intent Drawings and Documents which are essentially generic concepts and details. At the same time, the Employer should also take care not to prejudice his contractual position by assuming responsibility for the design (in part or in whole) if a detailed design is mandatorily imposed on their DBC .

The Employer's team of consultants is advised to put in as provisos in all their Design Intent Drawings and Documents that the documents are not for construction, that these are only indicative of the Employer's Design Intent and that the responsibility for design performance shall remain with the DBC.

7. Responsibility of Design- The design and build form of contract must place "full" responsibility for design on the contractor. It might be contended that such provisions would only operate if "full" design is undertaken by them, otherwise the Employer shall be liable for the detailed design. Therefore, the provisos mentioned above must be made clear in the Form of Contract.

As mentioned above, the basic difference for the Contractor is that the Contractor assumes liability for the design. The DBC engages his own design team of consultants to take the Employer's design (preferably up to the level

of General Arrangement Drawings @ 1:100 and up to the level of Design Intent Drawings and Documents) to come up with a Tender design (e.g. as Construction Drawings and as "shop drawings") that complies with the Employer's requirements at the Tender stage , and subsequently to produce more detailed construction drawings and shop drawings for Employer's approval prior to actual construction.

8. The "Submitting Person" – In the D&B Contract, the submitting person (to the Approving Authorities) becomes under his team of consultants (i.e. the Architect –of –Record is in the D&B's team). This has implications with regard to expeditious receipt of approvals and design and contractual compliance to authorities' requirements.

9. A 'Partnering' attitude and relationship between the DBC and his team of consultants- For the inexperienced DBC, the selection of the members (i.e. his own designers) for his design team is vital. Not only should he select those that know how to integrate their portion of their work into the overall design intended by the DBC, it is imperative that each team member knows how to receive instructions from the DBC and the DBC's program of work.

Human relationship problems may occur if the DBC's team of consultants are not accustomed to receiving instructions from a contractor. Irrespective of the terms and conditions of contract at hand, some consultants tend to either

RML 5/2

consciously or sub-consciously attach more weight to the requirements of Employers rather than contractors.

Some consultants appear to be accustomed to the traditional form of arrangements and are inflexible when taking instructions from contractors. The "Employer vs Contractor" and siding of the former stereotype should be reconsidered as their services are now rendered to what had been previously a seemingly "opposite side".

As it is the role of the contractor to set up his own design team, the selection process for design consultants must be exercised with care to ensure that they are able and willing to receive instructions from a contractor and that the basis for working together is one of "partnering"

At the same time the consultants must exercise integrity in design compliance with regard to public safety and Authorities' requirements.

10. Novation of the Employer's Team of Consultants- Another approach would be to novate the Employer's entire team of Consultants to the DBC. However a hasty Employer or DBC is likely to end up in dispute relating to division or apportionment of design responsibility, the relationship between consultants, professional indemnity or responsibility in design team, and in obtaining the approvals from the relevant Approving Authorities prior to commencement of

works on site. This will be discussed in further detail in the latter part of the chapter.

11. Case law and precedents- Since design and build case laws are virtually non-existent, Employers and Contractors will need to exercise good judgement and rely on the expertise of their consultants to guide them through this relatively new ground with few precedents. Tan (2001) also identified the potential legal pitfalls of D&B which among them are:

- Design development stage
- Variations to design
- Quality Control
- Price of Contract
- Interim controls and the roles of those involved.
- What is provided was not what was expected by the Employer.

The ability for the players in the Malaysian construction industry to undertake the D&B process successfully hinges upon:

- Understanding what Design and Build means
- Understanding what it encompasses
- Being prepared to accept the roles required by design and build contracts
- The definition of those roles
- The proper pricing of those roles

12. The advantages and disadvantages of Design and Build can be summarized as such:

Table 1: Chapman & Powell-Smith (1993) – JCT standard Forms of Building Contract with Contractor's design, 1981 ed. : Advantages and disadvantages of Design and Build.

| ADVANTAGES | DISADVANTAGES |
|---|---|
| <ul style="list-style-type: none"> - The employer has a single point of responsibility to which he can refer throughout the procurement process and after construction is complete if there are any latent problems. This is in contrast to the traditional system where the employer's point of contact is the architect, but if there are difficulties, responsibility may lie with the contractor, the architect , engineer etc. - The cost is virtually guaranteed and there is a better than average chance of meeting a fixed completion date - The total procurement period is likely to be shorter than a similar project using traditional methods because the contractor is in charge of the whole | <ul style="list-style-type: none"> - The system is not flexible. If the employer makes any changes in his requirements, it opens the door to claims for extensions of time and direct loss and/of expense. - The Employer's Requirements must be prepared carefully so as to reflect his wishes accurately while giving proper scope to the contractor. The contract is unforgiving to the extent that badly assembled Requirements will result in Contractor's Proposal which do not satisfy the employer. - Because the relationship between Employer and contractor 's architect is not the close one of client and independent consultant, and because the consultant may be under the |

| | |
|--|---|
| <p>process</p> <ul style="list-style-type: none"> - Except when JCT design and build form CD81 is used, the contractor undertakes that the finished building will be fit for its purpose. Other contracts may also limit the contractor's responsibility. - The design concept is buildable - There are likely to be fewer claims because the factors which commonly trigger such claims are under the control of the contractor. | <p>contractor's instructions to design down to a price, the quality of design may not be as good as a building produced in the traditional fashion.</p> <ul style="list-style-type: none"> - The employer will be involved in additional fees. The design fees which the employer would normally pay to his consultants will be included in the contractor's design and build price. The employer will need independent professional advice and therefore, he will pay extra for it. |
|--|---|

13. There are many types of Design and Build variations that are available depending on the degree of input of responsibility and risk taken by the Contractor and the Employer.

*Table 2: Chappell & Powell Smith (1993) , Janssens (1991) and Turner (1986)-
The variations in design and build .*

| | <i>Variations</i> | <i>Description</i> |
|---|--|---|
| A | Design and Build <ul style="list-style-type: none"> • single stage tender • two stage tender | The contractor takes full responsibility for the whole of the design and construction process from initial briefing to completion of the project. This is the term which the industry tends to use as the |

general name for all variants of this procurement category. The single stage tender involves a thorough proposal from schematic stage to detailed stage while the two stage tender breaks up the process into two to avoid wastage of cost and manpower and to limit the number of tenderers.

B Develop and Construct

Derived from the concept of developing the details from the schematic design derived from the client's architect.

C Design and Construct

This is the wider term. It includes design and build, but also other types of construction such as purely engineering works of various kinds.

D Package Deal

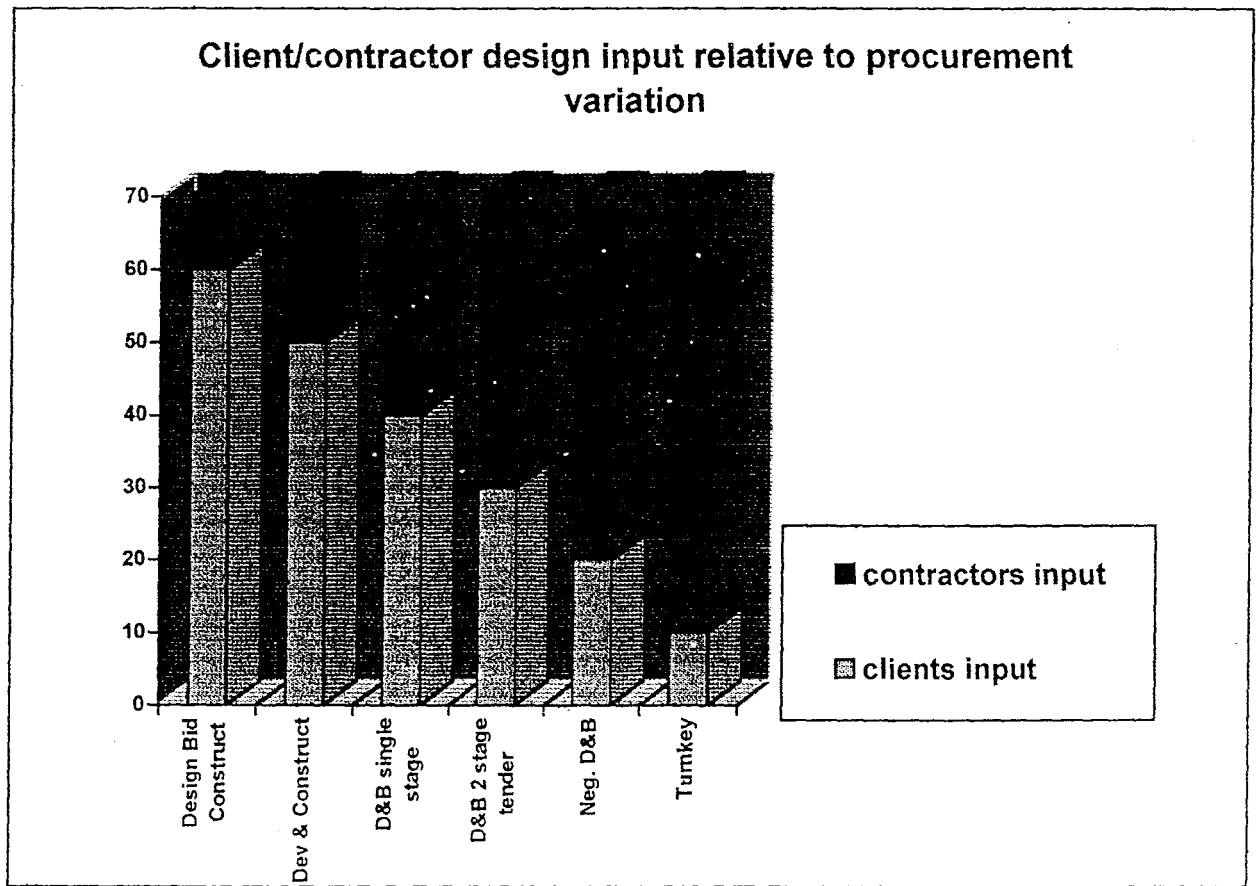
This term can be used to refer either of the previous situations. Strictly, the term suggests that the contractor is responsible for providing everything. It particularly refers to systems of industrialized buildings which can be purchased and erected as a package. The employer usually is able to view a similar completed building before proceeding. Closed systems of industrialized buildings are indicated.

E Turnkey

This is a procurement method in which the contractor really does everything, including providing the furniture if required. The idea is that

| | | |
|---|---------------------------|--|
| | | when the employer takes possession, all that remains to be done is to turn the key. However, it is not a precise legal term. |
| F | Negotiated Design & Build | A term to refer to a negotiated procurement method with a single contractor at the inception of a project. |
| G | Design and Manage | This is not strictly a design and build at all, but simply an architect-led version of the contractor led construction management. |

Fig 2 -Client/ contractor design input relative to procurement variation .



14. The variations of Design and Build may be chosen depending on the various circumstances as well.

Table 3: Varieties of Design-Build suitable for circumstances related to design.

| Circumstances related to Design | Possible Variety of Design & Build |
|---|---|
| <ul style="list-style-type: none"> The employer already has a design team in place. | <ul style="list-style-type: none"> Develop and Construct Design-Build (single stage tender) |
| <ul style="list-style-type: none"> The employer wishes to control the design team closely during the conceptual stage. | <ul style="list-style-type: none"> Develop and Construct Design-Build (single stage tender) Negotiated Design-Build |
| <ul style="list-style-type: none"> The building design is highly specialized and can only be designed by a specialist consultant, or the employer himself. | <ul style="list-style-type: none"> Design-Build (single stage tender) Develop and Construct Negotiated Design Build |
| <ul style="list-style-type: none"> The building is highly specialized but the expertise lies within contractor's organization. | <ul style="list-style-type: none"> Design-Build (2 stage tender) Negotiated Design- Build Design and manage Turnkey |
| <ul style="list-style-type: none"> The building is to be prestigious (the choice of contractor, designer and employer's representation are most important) | <ul style="list-style-type: none"> Develop and Construct Design-Build (single stage tender) Design-Build (2 stage tender) Negotiated Design-Build Design and manage Turnkey |
| <ul style="list-style-type: none"> The building is one of a series of similar buildings | <ul style="list-style-type: none"> Develop and Construct Design-Build (single stage tender) Negotiated Design-Build Design and manage Turnkey |
| <ul style="list-style-type: none"> The employer predicts that there will be a substantial number of changes (Note: | <ul style="list-style-type: none"> Develop and construct Design-Build (single stage tender) |

| | |
|--|--|
| <p>The contract document should contain a detailed schedule of rates and the employer's rep. Should have costing expertise).</p> | <ul style="list-style-type: none"> • Design Build (2 stage tender) • Negotiated Design Build • Design and Manage • Turnkey |
| <ul style="list-style-type: none"> • The employer wishes to investigate a costed design competition. | <ul style="list-style-type: none"> • Design Build (2 stage tender) |

2.1.3 The roles of consultants in D&B

The construction industry is currently undergoing changes at a tremendous rate that have affected the traditional role of the architects and other consultants. Building contractors are now better poised to undertake large projects and provide clients/ users with the necessary guarantees and undertakings for proper delivery. Notwithstanding that these are normal prerequisites for a building contract, the contractors are becoming more litigious and claims conscious than ever before. They are also better managed and manned with qualified personnel and technicians including quality surveyors, engineers and even architects.

Architects who are traditionally revered as professionals who protect the client's interest against the unscrupulous doings of the contractors are now marginalized for their own weaknesses in handling the complexities of contract administrations. They are sidelined in these areas which actually determine the delivery of the project as well as controlling its costs.. Architects claim that their training and scope of service include the coordination and management of the

other consultant's work. In practice, it is difficult to expect the other consultants to perform under the architect when they are financially beholden to the client directly, no matter what the conditions of engagement say. This may be further exacerbated by the architect's own weaknesses of not being able to deliver their part of the works be it drawings, details or management abilities (Haji Esa, 2001).

Design & Build / Turnkey is widely used by the Government in infrastructure and building projects. With the introduction of privatization in the mid 80s, turnkey system have become more and more complex with the introduction of BOT (Build –Operate – Transfer), BOO (Build- Operate –Own), Deferred payment contracts, management consultancy and D&B. One can see the lesser emphasis on the role of the consultant architects as the lead players in the industry delivery system. The engineer on the other hand can offer alternative engineering solutions that can be cost effective as well as meet the functions and fit for purpose. They have saved clients' money through value engineering which is becoming the lexicon in the industry.

For a consultant to be effective in the D&B process he has to have the desirable attributes of:

- 1) Good communication.
- 2) Common goal
- 3) Responsibility autonomy and authority
- 4) Accountability.

- 5) Trustworthiness
- 6) Diligence and innovation
- 7) Self- critical
- 8) Team- player
- 9) Leadership.

For a consultant, the normal obstacles encountered in D&B are:

- 1) End user indecision causing delays in design freeze
- 2) Interfacing issues
- 3) Committed leadership
- 4) Getting everyone to be a team player
- 5) Document tracking
- 6) Collocation

Haji Esa (2001) list the advantages for the consultants to be involved in D&B as:

- 1) Single point responsibility
- 2) Simplifying risk management
- 3) Relieving the owners of coordination responsibility
- 4) Breakdown of the adversarial relationship between architects, engineers and contractors.
- 5) Better collaboration in the design development

2.1.4 Novation of Consultants in D&B.

Low (2001) states that, "...Novation means the employer's contract of appointment with the consultants is transferred to the contractor, as if the contractor had been the employer from the onset. It is a legal concept formally providing for the re-employment of the consultant by the contractor. It is a three party agreement. The employer drops out of the contract. The contractor takes over all the contractual responsibilities of the consultants. The intention of the novation is to extinguish all the employer's obligations and liabilities to the consultants....the novation is not a requirement in Design and Build....".

If the employer was contemplating to let the work out to a design and build contractor, the design consultant's roles will be limited to only the initial design stage and the consultant's roles will be limited to only the initial design stage. The consultants will have to give a letter of discharge when the design and build contract is awarded. This is to enable the contractor to appoint other consultants to continue with the detailed design for construction. Design and build tenders based on the same design are easier to evaluate. In addition, design and build may not encourage innovative design if the contractor is to compete on price.

Unless there are contract conditions that the contractors must reemploy the existing team of design consultants, the contractor will be able to appoint his

own consultants to carry out the detail design. Novation of the design consultants in this instance does not arise. The employers consultants thus cease to be involved further in the project when the work is awarded , unless they are retained by the Employer to act as the contract administrator to monitor the design and build contractor. Otherwise any further involvement may need the consent of the Employer.

The reasons for novation are:

- 1) Consultants may wish to be retained to continue with the detailed design during the implementation stage. The only way to have the consultant further involved would be for the employer to agree to the novation .If this is required, it must be part of the design and build conditions.
- 2) It may also be the employer's intention that the appointed consultant continues with the detailed design under the contractor as he envisage that he may have certain control over the design and quality of the building through his own selected consultants.

If the contractor chooses of his own accord to re-employ the consultant after the pre-contract stage and the employer has no objection to the contractor re-employing the same consultant, this is not considered novation. There are no standard novation agreements. In fact, the proper way to draft a consultant's appointment in a way that it can be novated effectively is to have 2 sets of

RML 572

services, one set owed to the employer before novation and the other set of services owed to the contractor after novation. If this was not done, the alternative is to have an amendment document indicating how the appointment agreement is to be amended post novation.

Despite all the efforts by the employer to novate the consultants to the design and build contractor, and hopefully having a better deal in the contract, there is nothing in a novation agreement to prevent the contractor from terminating the employment of the employer's consultants and re-appointing his own team of consultants. The termination could be based on legitimate reasons such as non-performance. The employer may have limited recourse if the contractor's progress works is not affected. After novation, the employer has no more contractual say and cannot insist on the employment of the employer's original consultant if the contractor chooses to terminate them.

2.1.5 'Fitness of purpose' and 'due diligence'- its relation with consultants under D&B.

Low (2001) defines 'fitness of purpose' in design and build to mean that the product produced must be suitable for its intended use and that it is an absolute obligation where liability is strict. This is different from contracting on the basis of due diligence where there is only an obligation of reasonable skill and care and the need to prove negligence is benchmarked against that of a

professional man of equivalent standing. Fitness of purpose may be expressed in the contract or implied and the lack of skill and care is irrelevant. The responsibility is not only in design but also the materials and workmanship that must be suitable for its purpose.

An example of fitness of purpose is found in that of FIDIC Design- Build and Turnkey Contract 1995 which is meant for international use (and consistent with English Law) ;

Clause 5.4 which provides for:

“ The design, the construction documents, the execution and the completed works shall comply with the Country’s national specification, technical standards, building, construction and environmental regulations, regulations applicable to the product being produced for the Works, and the standards specified in the Employer’s Requirements, applicable to the Contractor’s Proposals and Schedules, or defined by Law”

So, there has to be fitness of purpose according to contractual and statutory aspects. Only an expressed provision limiting liability to “reasonable skill and care” would give contractors the protection from the all encompassing ‘fitness of purpose’ clause.

In the ICE Design and Construct Conditions, clause 8(2)(a) provides for this purpose:-

“ In carrying out his design obligations under the Contract.....the Contractor shall exercise all reasonable care and diligence. “

Parties wishing to limit contractor's liability under the NEC (New Engineering Contract) form may use option M which states:-

“ The Contractors not liable for Defects the Works due to his design so far as he proves that he has used reasonable skill and care to ensure that it complied with the Works information.”

Under the JCT Design and Build 1981 Form clause 2.5.1 refers to;

“ In so far as the design of the Works... and in what the Contractor is to complete... the Contractor shall have in respect of any defect or insufficiency in such design the like liability to the Employer, whether under statute or otherwise, as would an architect or, as the case may be, other appropriate professional designer holding himself out as competent to take on work for such design, who acting independently under a separate contract with the Employer, had supplied such design for and in connection with the works to be carried out and completed by a building contractor not being the supplier of the design”.

The clause intention is to oust the "fitness of purpose" where the obligations based on the like obligation of an architect implies "reasonable skill and care". The purpose of expressed "reasonable skill and care" is to exclude the implied liability of "fitness of purpose" which is inherent in D&B procurement. It is quite common though unfair to benchmark the "fitness of purpose" against "world standard" construction standards as the definition of "fitness of purpose" may be quite open ended.

In the case where contractor has breached his "fitness of purpose" obligations and his liability is not limited by any "due diligence clause", then he may attempt to pass this loss in whole or in part to his design consultant through 'design warranties' under the principle of 'vicarious responsibility' where consultants' liabilities can never be 'fitness of purpose' as he doesn't 'build' it but rather his liability is through negligence for failure to interpret the desired client's requirement to the best of his ability comparable with a professional of equivalent standing. His conduct would come under scrutiny through arbitration and his liability would be proportionate to the ratio of defect design work to total works obtainable from his fees.

However, under certain circumstances consultants may inherit the "fitness of purpose". Low wrote, "...*Consultants whether working under a design and build contractor, or as Employer's Representative on the same contract may also unexpectedly find themselves liable for "fitness for purpose."* Consider the 1998